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and hence the youth of one sex plunge into vice early and openly, more perhaps, from rage against their persecutors, than from natural inclination; and those of the other fly into the arms of the first man who offers to be their deliverer, form unequal matches, or become victims of a far more deplorable misfortune.

They may be, however, and there often is, a defect in the conduct of parents of a nature the very opposite, namely, that of loving their children too much, or more properly speaking, to their ruin. Dreadful are the consequences of that blind affection which will see no fault in a child, and suffer all the untoward propensities of his nature to grow up and strengthen, for fear of afflicting him by control: parents, who are invested with a species of sovereign authority over their children, should use it with tender reluctance on all occasions, but when necessary with inflexible justice, nothing should stand between them and the most sacred duty; but if from the beginning, education has been rightly instituted, there will seldom if ever be occasion for the exercise of this unwelcome privilege. The heart under proper regulation, will beat in sympathy with the warm wishes and expectations of parental love, and reward it by a life of virtue and benevolence.

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SIMPLE SCIENCE.

ON AIR, WATER, AND EARTH.

WHAT properties is *oxygen gas* remarkable for? It is essential to animal life; and is likewise so favourable to combustion, that wire will burn away in oxygen gas, as dry wood does in common air.

What are the properties of *nitrogen gas*, (otherwise called azotic gas)? It is destructive of animal life; and the process of burning could not go on in it. It would be extinguished.

What is *hydrogen gas* remarkable for? For its inflammability. It is called inflammable air.

Of what is atmospheric, or common air, a compound—and what are the proportions of its component parts? Of oxygen gas, and nitrogen or azotic gas; in the proportion of 22 parts of oxygen gas, and 78 azotic.

Perhaps it would be more correct to consider atmospheric air, as but *one* gas; consisting (of course) of caloric, helping in solution oxygen, and nitrogen.

22
78
——
100

What has oxygen gas been called? *Vital air;* and in fact it is the basis of vital air. Without it our atmosphere would not be respirable.

Is carbonic acid gas respirable? No; it cannot be breathed. It would soon destroy animal life; and is as unfavorable to combustion. A lighted candle, on being thrown into it, is quenched as quickly as if it had been put into water.

Of what gas are the *gas lights* composed? Of hydrogen gas, which is obtained from coal by distillation.

Of what is water composed—in other words, what is water? Of hydrogen and oxygen, in the proportion of 12 parts in the 100 hydrogen, and 88 part oxygen.

What is the difference between ice and water? None; but the ice contains less caloric than water, or water is fluid ice. Just as lead, whether cold or melted, still is lead.

To bring them to a fluid state, do all bodies require the same quantity of caloric to be added to them, and to become part of their composition? Far from it. Thus lead is solid at the common temperature of the atmosphere, and requires an addition of caloric to melt it—i. e. to render it fluid. On the contrary, quicksilver is, at the common temperature imperfectly fluid, and requires the application of artificial cold—(i. e. the removal of some caloric) to make it solid and malleable like other metals—so ice at the common temperature is fluid, and is called water.

A certain quantity of *oxygen* makes a substance become an *oxide*. Add more oxygen and you produce an *acid of the ous class* Add still more oxygen, and you obtain an acid of the ic class. Thus, if the quantity of *caloric* which a substance contains be small, the substance will be solid. Add more caloric and you produce a liquid. Add still more caloric, and you procure a gas.

Is there any connection between the presence of caloric and the existence of animal life? It seems intimately connected with, and essential to animal life; and the icy, or at least marble-like coldness which follows the extinction of life is striking.

What is marble or limestone—i. e. what are its component parts? It is carbonate of lime; therefore, in strictness, it may be called a salt, being composed of carbonic acid and lime, (the earth-lime).

How may we more accurately enumerate its constituent parts? By considering its constituent parts as three in number—viz.

1st. *Calcium*, which is the metallic basis of the earth-lime.

2dly. Carbon.

3dly. Oxygen—viz. the oxygen which has made the calcium an oxide, and the oxygen which has made carbon an acid.

How may we describe epsom salts, (or sulphate of magnesia) as to its component parts? As consisting of

1st. Magnesium, the base (supposed metallic) of the earth magnesia.

2dly. Sulphur.

3dly. The oxygen, which, combined with sulphur forms sulphuric acid; and it, combined with magnesium, forms the oxide or earth magnesia.

Of what ingredients is gunpowder composed.

1st. Nitre—i. e. nitrate of potash	76
2dly. Sulphur, ...	9
3dly. Charcoal, ...	15
	100

We have, in the instance of sapphire, and its variety ruby, seen alumine alone form a gem. In what instance does silex do the same? *Amethyst* may be considered as wholly composed of silex. I do not mean what is called oriental amethyst; and which is only a variety of the sapphire.

What do we mean by an ore? A metal mineralized, by being mixed with other substances, which must be separated from it by smelting.

Is gold found native, or in the state of an ore? Always native; never as an ore; but often *lightly* alloyed with silver, copper, &c.

What is the difference between an oxide and an acid? When a subtance is combined with a *small* proportion of oxygen, the compound is called an oxide; when with a large proportion, it is called an acid; from the sour taste in general of such compounds

◆

ON THE RISE AND FALL OF MERCURY IN THE BAROMETER.

The fact, that the mercurial column generally falls before foul and rainy weather, seems quite at variance with the intimation of our senses, as it is a generally prevalent notion, that the air is heavier when the sky is lowering and is overcharged with clouds and vapours. The contrary, however, is the case; and may serve to show the generally fallacious nature of many common opinions in matters of science and philosophy.

That the rise and fall of the mercury in the barometer is occasioned by some corresponding reduction or accumulation in the atmosphere at the place of observation, will be evident to every one who will take the trouble of thinking on the subject.

We need hardly state that the column of mercury is a representation of a column of atmospheric air of an equal thickness; and as such serves to show the various changes that take place in the great ærial envelope of our earth.

With respect to the effect produced by storms and high winds, it may be observed, that a number of contingent circumstances are to be taken into account. The diurnal motion of the earth on its axis contributes to effect the depression of the atmospheric fluid, principally by retarding or increasing the motion of the wind. If the wind blows from the east, the diurnal motion of the air round the earth's axis is lessened, and it will be more at liberty to gravitate or press freely on the surface of the earth, and consequently to raise the barometer. On the contrary, westerly winds, by conspiring with the diurnal motion, diminish the vertical pressure, and of course the barometer is generally lower with westerly winds than with easterly. The descent of the mercury is, we think, frequently influenced, in a very considerable degree, by the reaction of the wind on the inequalities of the surface of the earth. When a wind moving horizontally meets with an inclined plane, such for instance as the side of a hill or mountain, its direction is thereby more or less elevated, and an increased pressure necessarily takes place on the reflecting surface, while on the opposite side a decrease of pressure will be the consequence. The pressure indicated by our barometers in sheltered situations, being only the diminished pressure on the declining plane, will, of course, be less than is really the case, and this will, we presume, afford a satisfactory reason why the barometer is so generally depressed during storms, especially if the surface of the country is hilly or uneven.

The augmented elasticity communicated to the air by the action of heat or the presence of humidity, and the reduction of the incumbent mass by the action of the winds, have, no doubt, each a separate influence in disturbing the equilibrium of the ærial ocean.

The influence exerted by moisture existing in the air in a vaporous state, over the atmospheric pressure indicated by the barometer, is distinctly shown by the fall of the mercury, which is generally observed to precede rain. The quantity of moisture in the air, in the form of a vapour, varies with its temperature at the time, and its elasticity is, from the same cause, liable to variation. The weight of a certain quantity of vapour, supposing the temperature and other circumstances the same, is less than an equal quantity of air, in the proportion of about 5 to 8; of course, the increased humidity of the atmosphere will tend to lower the barometer, by removing the air immediately above it, and substituting in its place a lighter fluid.

As simplicity is the most beautiful, as well as the most useful ingredient, in our philosophical theories, the following is given as possessing this quality in a very tolerable degree, and as containing the substance of volumes of philosophical inquiry. Suppose any part of the atmosphere to be more than usually heated, the air will be proportionably expanded, and that of the neighbouring regions will, of course, rush in to restore the equilibrium: a greater quantity of air being thus brought together, and its elasticity being at the same time increased by the action of the heat, it will be better able to support the vapours with which it is loaded; these are also, from the same causes, more intimately mixed with the air, and, of course, cause the weather to be serene and fair. If, on the contrary, the atmosphere over any particular place be from any cause cooled considerably more than the surrounding portions, numerous currents of air will move off towards the warmer regions, leaving a kind of comparative vacuum, which is unable to support the numerous vapours with which it is always replete, and these, of course, precipitating, collect into clouds, the particles of which unite, and form drops of rain.

As, however, our atmosphere in its transparent state can, according to recent experiments, receive no heat from the sun by direct radiation, it becomes a matter of curiosity to see in what manner certain portions of that fluid become heated, so as to produce the effects in question. The surface of the earth in any particular place being heated by the immediate influence of the sun's rays, the heat is slowly communicated to the surrounding air, by *reflection;* this becoming, of course, lighter, will ascend, giving off its heat gradually, during the time of its ascent, till it has arrived at a part of the atmosphere of equal specific gravity with itself, where its tendency to ascend ceases. Its original situation on the surface of the earth being occupied by a fresh portion of cold air, the same process is repeated, till the earth becomes of an equal temperature with the surrounding air.

It appears, of course, that it is by reflection that the air is heated, or, in other words, by the sun first heating the earth, from which the heat is gradually imparted to the air immediately over it. This air may, however, in its ascent, be carried to a considerable distance from the place where it was first heated, by the action of already formed currents in the atmosphere, and consequently the effect take place in a different part of the earth altogether.

On the whole, we may just observe that the changes in the atmospheric pressure, as indicated by the barometer, much surpass the regular and natural operations that could possibly be produced by any causes that have been yet assigned. By an accurate calculation, it appears that at times when difference of pressure, to the extent of nearly two inches, was observed in the mercurial column, in the course of a few days, the precipitation of the whole of the moisture in the atmosphere could not at the same time produce the depression of more than about a quarter of an inch. From this, and similar considerations, it appears evident that some other powerful cause must operate on the volume of air surrounding our globe. The influence of electricity has been mentioned with a considerable appearance of probability. The manner, however, in which the electric fluid acts on the air through which it passes; whether by the immediate operation of that powerful and subtile agent, or through the chemical effects which it is capable of producing, is as yet only matter of conjecture, and may form the subject of some future observation, as circumstances may occur to direct our attention to the subject.

R.

SIGNS OF RAIN.

Written by the late Dr. Jenner, and sent as an excuse for not accepting the Invitation of a Friend to make an Excursion with him.

The hollow winds begin to blow,
The clouds look black, the glass is low;
The soot falls down, the spaniels sleep,
And spiders from their cobwebs peep,
Last night the sun went pale to bed,
The moon in halos hid her head;
The boding shepherd heaves a sigh
For, see, a rainbow spans the sky,
The walls are damp, the ditches smell,
Clos'd is the pink-ey'd pimpernell.
Hark! how the chairs and tables crack,
Old Betty's joints are on the rack;
Loud quack the ducks, the peacocks cry;
The distant hills are looking nigh.
How restless are the snorting swine.
The busy flies disturb the kine;
Low o'er the grass the swallow wings;
The cricket, too, how sharp he sings;
Puss on the hearth, with velvet paws,
Sits, wiping o'er her whisker'd jaws.
Through the clear stream the fishes rise,
And nimbly catch the incautious flies;
The glow-worms, numerous and bright,
Illum'd the dewy dell last night.
At dusk the squalid toad was seen,
Hopping and crawling o'er the green;
The whirling wind the dust obeys,
And in the rapid eddy plays;
The frog has chang'd his yellow vest,
And in a russet coat is drest.
Though June, the air is cold and still;
The mellow blackbird's voice is shrill,
My dog, so alter'd in his taste,
Quits mutton-bones, on grass to feast;
And see, yon rooks, how odd their flight,
They imitate their gliding kite,
And seem precipitate to fall—
As if they felt the piercing ball:
'Twill surely rain, I see, with sorrow;
Our jaunt must be put off to-morrow.

DUBLIN.
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